Norfolk Southern Railway, about 1½ miles north of the North Carolina border. *Poanes zabulon;* Bayford, Northampton Co.; near Adam's Swamp, Nansemond Co., about 1½ miles north of the North Carolina border and about 3 miles west of the Dismal Swamp. *Poanes yehl;* Green Sea, one male; Dismal Swamp, near Suffolk, one female. *Atrytone dion alabamae* (Figs. 11–14); Dahl Swamp, Accomac Co., common; Green Sea, Norfolk Co., one female. *Atrytone ruricola;* Dismal Swamp; Green Sea. *Lerema accius;* the commonest skipper in Nansemond, Norfolk, and Princess Anne Cos.; not seen in Northampton or Accomac Cos. *Amblyscirtes textor;* frequent everywhere in wet woods in Nansemond, Norfolk, and Princess Anne Cos., and locally common and even abundant about the Dismal Swamp. *Amblyscirtes carolina;* western border of the Dismal Swamp about 8 miles south of Suffolk, three, in company with large numbers of the preceding. *Lerodea l'herminier;* western border of Dismal Swamp, frequent: Virginia Beach, one. *Lerodea eufala;* Green Sea, Norfolk Co., one. *Prenes panoquin;* Wachapreague and Chincoteague Island, Accomac Co., abundant on *Borrichia frutescens;* Hack's Neck, Accomac Co.; Bayford, Northampton Co., common. *Prenes ocola;* Virginia Beach, one; Dismal Swamp, one.

ENTOMOLOGY.—*The bees of the genus* Agapostemon (*Hymenoptera: Apoidea*) *occurring in the United States.*[1] GRACE ADELBERT SANDHOUSE, Bureau of Entomology and Plant Quarantine. (Communicated by S. A. ROHWER.)

This study of the *Agapostemon* occurring in the United States was undertaken to facilitate the identification of these species. The results presented in this paper are based on the examination of about four thousand specimens and many dissections of the male genitalia.

The collection of the *Agapostemon* in the United States National Museum has served as a basis for this revisionary study. This was supplemented by loans from the American Museum of Natural History (through Dr. F. E. Lutz), the Academy of Natural Sciences of Philadelphia (through Mr. E. T. Cresson, Jr.), the Illinois State Natural History Survey (through Dr. T. H. Frison), Cornell University (through Dr. J. C. Bradley), McGill University (through the late Mr. Albert F. Winn), South Dakota State College (through Prof. H. C. Severin), the Bureau of Biological Survey (through Mr. J. R. Malloch), the University of Minnesota (through Dr. C. E. Mickel), and the private collections of Drs. Joseph Bequaert, Harold Morrison and T. B. Mitchell, Prof. H. A. Scullen, Mr. C. N. Ainslie

[1] Published by permission of the Chief of the Bureau of Entomology and Plant Quarantine. Received November 8, 1935.

and the late Mr. C. L. Fox (whose collection is now in the California Academy of Sciences).

I have also studied the types in the Academy of Natural Sciences of Philadelphia and wish to take this opportunity to express my appreciation of the courtesies shown me by Mr. E. T. Cresson, Jr., during my visit to that institution. Dr. T. D. A. Cockerell and the late Dr. James Waterston kindly compared specimens with the types of Smith's species in the British Museum. To Mr. E. P. Van Duzee I am indebted for the opportunity of examining certain paratypes from the collection of the California Academy of Sciences.

Genus Agapostemon Guerin

Agapostemon Guerin, Iconog. Regne Animal de G. Cuvier, Insects **3**: 448. 1844. Genotype, *Apis* (*Andrena*) *femoralis* Guerin. (Monobasic)

Agapostemon F. Smith, Cat. Hymen. Ins. Brit. Mus. **1**: 85–86, pl. 4, figs. 1–4. 1853.—Provancher, Natur. Canad. **13**: 203. 1882.—Petite Faune Ent. Canad., Hymen., p. 703. 1883.—Robertson, Trans. Acad. Sci. St. Louis **7**: 325. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7**: 159. 1901.

Halicti intermedii, Groupe *Agapostemon* Vachal, Misc. Ent. **11**: 89. 1903. —**19**: 12. 1911.

The name *Agapostemon* was proposed by Guerin in 1844 for a subgenus of *Apis* with *Apis* (*Andrena*) *femoralis* Guerin the only species included, although he mentioned having seen other species with the characters which he uses to define the subgenus. His definition is as follows: "*Nous connaissons plusieurs espèces a cuisses ainsi renflees. Ce sont des males. Peut-etre jugera-t-on a propos de les reunir en un sous-genre, que nous proposerions de nomer Agapostemon. Il serait aux Andrenes ce qu'est le genre Nomia parmi les Halictes.*" Frederick Smith (1853) was the first to give *Agapostemon* generic rank, in this being followed by Cresson, Robertson, Dalla Torre, Cockerell and Crawford; he included in it seven species, four of which were described as new. His discussion of generic characters was based chiefly on those of the head, especially of the trophi. Vachal (1903) treated *Agapostemon* as a group or subgenus of *Halictus* (*Halicti agapostemones*).

This genus can be separated from the other genera of the Halictinae represented in the nearctic fauna by the length of the posterior tibia, which is as long as, or longer than, the combined length of the tarsal joints, while in the others it approximates more nearly that of the metatarsus alone. The sexual dimorphism is so great that some characters will have to be given separately for each sex. The characters of the genus as here limited are as follows:

Head, when viewed from the front, appearing rounded except where the clypeus extends below the lower margins of the eyes. Eyes large and bare, forming the lateral boundaries of the head for most of its length; their inner margins quite strongly emarginate. Front foveolate-punctate, when viewed laterally, level with the eyes, occupying about one-half the space from vertex

to apex of clypeus. Clypeus and postclypeus of equal length, strongly convex, with well-separated punctures; clypeus extending at least half its length below the lower margins of the eyes; apical margin truncate. Gena (malar space) very short. Postgenae declivous behind the eyes, striate-punctate. Labrum of female with basal portion as wide as truncate apex of clypeus, sides nearly parallel; apical portion about one-third as wide as basal, sides converging toward apex and fringed with curved bristles; labrum of male nearly triangular, sides slightly convex, basal portion with transverse elevation. Mandible of female strongly curved, apically bidentate, inferior tooth much larger and extending beyond superior; mandible of male edentate, narrowing gradually to pointed apex. Antennae inserted about half way between apical margin of clypeus and postocellar line; scape of female a little more than one-third length of antenna, scape of male about as long as joints two to four.

General contour of thorax more regular than that of honeybee (see Snodgrass, *Anatomy and physiology of the honeybee*, fig. 231, 1925.), that of female more robust than that of male. Prothorax showing no striking modifications; posterior margin of prothoracic lobe heavily fringed with hair. Mesoscutum of male with uniform, nearly contiguous punctures, varying little among the species; that of female closely uniformly punctate or with punctures of two distinct sizes, the punctation specifically distinct. Metatergum irregularly foveolate. Mesopleura foveolate. Metapleura of female with somewhat irregular, but principally horizontal low carinae, of male foveolate. Propodeum extending caudad to a distance about equal to length of metatergum and thence abruptly declivous to attachment of abdomen; posterior surface irregularly carinate, enclosed by a sharply defined carina, more strongly developed in female; dorsal surface lacking the somewhat crescentic disk or enclosed space found in many of the other halictine bees; sculpturing consisting of low carinae variously arranged; lateral surfaces with nearly horizontal low carinae, between them rows of small but deep punctures. Tegula smooth, ovoid, about same color as basal wing-veins. Wings varying little from those of related genera and little within the genus; hyaline, slightly yellowish infumate, usually slightly darker apically; second cubital cell of male distinctly narrower.

Legs of female and front and middle legs of male not varying in structure within the genus; hind legs of male showing greatest modification and varying with the species. In hind leg of female, posterior surface of femur with a single row of very long and strongly curled branched hairs; anterior surface with several rows of shorter branched hairs; hind tibia with knee-plate obsolescent, posterior margin with long simple hairs, anterior margin with variously branched hairs; inner calcar pectinate, usually with from three to five broad spatulate teeth. Hind leg of male with femur usually thickened, distinctly wider than trochanter and toothed below near apex; tibia broader than metatarsus; metatarsus frequently enlarged and toothed; first and second joints of tarsus coalescent.

Abdomen of female broadly ovoid, length as ordinarily extended about twice its width at apex of second tergite; tergites finely and uniformly punctured; fifth tergite with median rima, laterally densely pubescent; sixth tergite with well-defined pygidial area; second to fifth with basal fasciae of pale appressed hair. Abdomen of male more slender and frequently curved downward at apex; seven tergites, but only six sternites exposed; tergites uniformly punctured and pubescent, seventh with a distinct polished oval pygidial area bounded apically and laterally by a carina; sternites one to

six varying little within the genus, seventh and eighth very small and lying against ventral surface of basal ring, with slight specific differences.

In both sexes head and thorax brilliant blue-green (as in *Chrysis*); abdominal tergites of female concolorous with thorax, or black or brown, tergites of male transversely banded black and yellow, the black sometimes obscurely tinged with blue-green. Legs of female brown or yellowish brown, of male yellow variously marked with black.

The genitalia of the male are specifically distinct and a study of them has assisted greatly in determining the amount of variation within the species. Since the paper by Beck (Proc. Utah Acad. Sci. 10: 89–137, pls. I–VII. 1933) gives the results of rather extensive studies in homologies of parts of the male genitalia of bees, his terminology was used in labeling these parts. For a description of the genitalia of a species of *Agapostemon*, see page 109 and plate VII, figures 168–169 of his paper. In the present paper dorsal and ventral views of the entire genitalia are given for *Agapostemon virescens* (Fabricius), since they approach most nearly those of the genotype, *femoralis* (Guerin), and for each species a dorsal and slightly caudal view of only the distal portion of the coxopodite and stylus, since they present the greatest specific differences.

KEY TO THE SPECIES OF AGAPOSTEMON OCCURRING IN THE UNITED STATES

1. Females.....2
   Males.....10
2. Abdominal tergites not concolorous with the thorax, but black, brown or testaceous.....3
   Abdominal tergites concolorous with the thorax, brilliant green or blue-green.....6
3. Apex of clypeus black. Abdominal tergites entirely black; base of first tergite with lateral patches of white hair; hair on apices of tergites black. Posterior surface of propodeum with oblique carinae. Front and middle legs dark brown. Tegular and wing-veins brown-testaceous.....4
   Apex of clypeus yellow, or black and yellow. Abdominal tergites testaceous, brown, or, if nearly black, always tinged with brown or blue-green, especially apically; base of first tergite with a wide band of dense white hair; hair on apices of tergites white, except on the fifth, where it is yellowish or brownish. Posterior surface of propodeum irregularly carinate. Front and middle legs largely or partly yellow. Tegula and wing-veins yellow-testaceous.....5
4. Base of mandible yellow. Postgenae laterad of the hypostomal carinae with several moderately coarse striae. Hair on posterior legs strongly infuscated. Head and thorax brilliant green, usually not at all bluish. Carinae on dorsal surface of propodeum not forming a median triangle. Punctures on abdominal tergites separated by twice the diameter of a puncture. Species smaller, 11 to 12 mm. long.....
   .....*virescens* (Fabricius)

Base of mandible reddish black. Postgenae laterad of hypostomal carinae very finely striate. Hair on posterior legs yellowish white. Head and thorax green, usually strongly tinged with blue. Carinae on dorsal surface of propodeum forming a median triangle. Punctures on abdominal tergites separated by the diameter of a puncture. Species larger, 14 to 15 mm. long..... *coloradinus* (Vachal)

5. Scape largely yellow. Femora and abdomen testaceous. Yellow of clypeus extending upwards in the middle to form a triangle; apical margin yellow..... *melliventris* Cresson

Scape dark brown. Femora and abdomen dark brown, the apex of the latter faintly tinged with blue-green. Yellow of clypeus not extending upwards in the middle; apical margin black..... ..... *melliventris* var. *plurifasciatus* (Vachal)

6. Mesoscutum with punctures nearly uniform in size and nearly contiguous 7

Mesoscutum with well-separated punctures of two distinct sizes....9

7. Mesoscutum not at all rugose between punctures, more finely and uniformly punctured. Abdominal tergites appearing dull, with punctures separated by less than their diameter. Dorsal surface of propodeum dull, with irregularly anastomosing carinae. Pubescence strongly tinged with ochreous. Wings dusky, especially at the apices ..... *splendens* (Lepeletier)

Mesoscutum rugose between punctures, more coarsely punctured, foveolate-punctate on the anterior and lateral portions. Abdominal tergites shining between punctures, which are separated by more than their diameter. Dorsal surface of propodeum shining, with longitudinal carinae. Pubescence and wings paler.....8

8. Species larger, usually about 12 to 13 mm. long; blue-green. Pubescence white. Sixth abdominal tergite with hair on the basal third entirely pale..... *cockerelli* Crawford.

Species smaller, usually less than 10 mm. long; green, not at all bluish. Pubescence distinctly yellowish. Sixth abdominal tergite with hair fuscous, except for a small patch of yellowish hair at each side; no pale hair on the median basal portion..... *radiatus* (Say)

9. Smaller punctures of mesoscutum usually separated by about their diameter. Dorsal surface of propodeum irregularly carinate, usually with a distinct median triangular area. Species larger, about 12 mm. long. Pubescence slightly tinged with yellow..... *texanus* Cresson

Smaller punctures of mesoscutum usually separated by at least twice their diameter. Dorsal surface of propodeum with longitudinal carinae. Species smaller, about 10 mm. long. Pubescence pure white.. ..... *angelicus* Cockerell

10. Base of first abdominal tergite usually of a brownish tint, but never distinctly black; dark bands on the intermediate tergites scarcely

one-third the length of a tergite. Legs distad of the trochanters pale, except for a brownish spot at the apex of the hind femur and one at base of hind tibia; hind femur hardly wider than the trochanter, the tooth near the apex weakly developed. Wings clear testaceous....11

Base of first abdominal tergite black; dark bands on the intermediate tergites fully one-half the length of a tergite. Legs distad of the trochanters conspicuously marked with black; hind femur distinctly wider than trochanter, the tooth near the apex strongly developed. Wings quite strongly infumated.....12

11. Trochanters of front and middle legs yellow, of the hind legs tinged with green. Scape entirely yellow, or with a small brownish dot on upper side near the apex. Dark bands on the abdominal tergites not reaching the lateral margins.....*melliventris* Cresson

Trochanters of all the legs green. Scape with the upper side brown. Dark bands on the abdominal tergites reaching the lateral margins.. .....*melliventris* var. *plurifasciatus* (Vachal)

12. Dark bands on the abdominal tergites strongly tinged with metallic blue-green, which is especially conspicuous laterally on the apical segments.....13

Dark bands on the abdominal tergites dull black, with no metallic tints.....14

13. Species larger, 11 to 12 mm. long, usually more yellowish green, with pubescence slightly yellowish. Dorsal surface of propodeum with a distinct triangle in the middle. Front and middle trochanters with varying amounts of black and yellow; if largely black, then there are marks of black on the bases of the femora; hind tibia always with a long black mark on the anterior surface, often also with one on the posterior surface.....*texanus* Cresson

Species smaller, about 9 mm. long, usually more bluish green, with pubescence pure white. Dorsal surface of propodeum without a median triangle, the carinae coarser. All the trochanters black, but no black on the bases of the femora; hind tibia with a long black mark on the posterior surface, but never with one on the anterior surface .....*angelicus* Cockerell

14. Hind femur swollen so strongly that its width is distinctly more than one-half of its length.....15

Hind femur not so strongly swollen, its width less than one-third of its length.....16

15. Black bands on the abdominal tergites occupying more than half of their length; fifth and sixth abdominal sternites largely black. Hind femur a little more than one-half as wide as long. Dorsal surface of propodeum dull, with irregularly anastomosing carinae. Wings dusky .....*splendens* (Lepeletier)

Black bands on the abdominal tergites occupying less than half of

their length; basal two-thirds of fifth sternite and most of sixth yellow. Hind femur about three-fourths as wide as long. Dorsal surface of propodeum more polished, with carinae on the entire length on the middle and laterally on the basal fourth principally longitudinal. Wings clear hyaline..... *cockerelli* Crawford

16. Species smaller, about 9 mm. long or less. Dorsal surface of propodeum with longitudinal carinae. Punctures of mesoscutum contiguous, giving a dull, almost velvety appearance. Abdominal sternites more than half yellow; apical margin of the fourth with a median green spot, laterally with two stout bristles on each side. Front and middle trochanters largely yellow; bases of femora yellow..*radiatus* (Say)

Species larger, about 11 mm. long. Dorsal surface of propodeum with irregularly anastomosing carinae. Punctures of mesoscutum more widely separated, the interspaces shining. Abdominal sternites largely black; apical margin of the fourth lacking the green spot in the middle between the lateral bristles. All the trochanters black; bases of femora strongly marked with black.....17

17. Black markings on the posterior surfaces of the front and middle femora confined to the basal halves, of the hind femur to the apical third; posterior surface of the hind tibia yellow, except for a small black spot near the apex; front and middle tibiae with basal spots of black. Abdominal tergites with much black hair apically. Second and third sternites with hair quite sparse; sixth with a low median carina. Head and thorax brilliant green, usually not at all bluish. Carinae on the dorsal surface of the propodeum not forming a median triangular area..... *virescens* (Fabricius)

Black markings on the posterior surfaces of all the femora and tibiae extending nearly the length of the surfaces. Abdominal tergites with hair largely white. Second and third sternites with conspicuous apical fringes of white hair; sixth without a median carina. Head and thorax distinctly bluish green. Carinae on dorsal surface of propodeum forming a median triangle..... *coloradinus* (Vachal)

Agapostemon virescens (Fabricius)

Andrena virescens Fabricius, Syst. Ent., p. 378, n. 12. 1775.—Spec. Insect. 1: 474, n. 16. 1781.—Mant. Insect. 1: 299, n. 18. 1787.—Olivier, Encycl. Method. Ins.; Hist. Nat. Ins. 1: 137, n. 23. 1789.—Fabricius, Ent. Syst. 2: 314, n. 28. 1798.

Apis (*Andrena*) *virescens* Gmelin, Linné, Syst. Nat., Ed. 13a, 1 (pt. 5): 2792, n. 185. 1790.

Apis virescens Christ, Natur. d. Insect., p. 154. 1791.

Andrena nigricornis Fabricius, Ent. Syst. 2: 313, n. 28. 1793.—Coquebert, Illustr. Iconogr. Ins. 2: 63, T. 15, fig. 7. 1801.

Megilla virescens Fabricius, Syst. Piez., p. 333, n. 23. 1804.

Centris nigricornis Fabricius, Syst. Piez., p. 360, n. 33. 1804.

Hylaeus nigricornis Klug, Magaz. f. Insectenk. 6: 222. 1807.—Magaz. Ges. naturf. Fr. Berlin 2: 57, n. 85. 1808.

Halictus nigricornis Say, Boston Jour. Nat. Hist. **1**: 394, n. 1. 1837.—Leconte, Writ. Thomas Say **2**: 772, n. 1. 1859.
Halictus dimidiatus Lepeletier, Hist. Nat. Ins. **2**: 283, n. 24. 1841.
Agapostemon nigricornis Smith, Cat. Hymen. Ins. Brit. Mus. **1**: 86, n. 1. 1853.—Cresson, Trans. Amer. Ent. Soc. suppl., p. 293. 1887.
?*Agapostemon tricolor* Provancher (not Lepeletier), Natur. Canad. **13**: 203. 1882.—Petite Faun. Ent. Canad. Hymen., p. 703. 1883.
Augochlora radiata Provancher, Natur. Canad. **13**: 205. 1882.—Petite Faun. Ent. Canad. Hymen., p. 705. 1883.—Dalla Torre, Cat. Hymen. **10**: 96 (in part). 1896.
Apis viridula Cresson (not Fabricius), Trans. Amer. Ent. Soc., suppl., p. 309. 1887.
Agapostemon bicolor Robertson, Trans. Amer. Ent. Soc. **20**: 148. 1893.—Dalla Torre Cat. Hymen. **10**: 97. 1896.
Agapostemon viridula Robertson (not Fabricius), Trans. Amer. Ent. Soc. **22**: 118. 1895.
Agapostemon virescens Dalla Torre, Cat. Hymen. **10**: 98 (in part). 1896.—Cockerell, Ann. Mag. Nat. Hist. (9) **8**: 363. 1921.
Agapostemon viridulus Robertson, Trans. Acad. Sci. St. Louis **7**: 325. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7**: 173. 1901.
Halictus (*Agapostemon*) *viridulus* Vachal, Misc. Ent. **11**: 90, 101. 1903.
Halictus (*Agapostemon*) *virescens* Viereck, Conn. State Geol. & Nat. Hist. Survey Bull. **22** (pt. 3): 704.

Type.—Female, in the Banksian Collection at the British Museum, where it was seen by Cockerell in 1921 and the identity of the species confirmed. The present locations of the types of *nigricornis* and of *dimidiatus* are unknown to the writer. The types of *bicolor* are in Robertson's collection.

Distribution.—Insofar as is known, distributed throughout the United States from coast to coast north of 40 degrees latitude, extending down the Mississippi Valley and eastern slope of the Rocky Mountains to Louisiana and Texas. About 700 specimens have been examined from the following states: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, District of Columbia, North Carolina, Alabama, Kentucky, Tennessee, Ohio, Michigan, Indiana, Illinois, Iowa, Minnesota, Missouri, Louisiana, Texas, Colorado, Kansas, Nebraska, North Dakota, South Dakota, Montana, Wyoming, Idaho, Oregon, and Washington.

Of the nearctic species, *virescens* and the closely related *coloradinus* are nearest to the genotype, *femoralis*. *Virescens* can be separated from *coloradinus* by the characters given in the key. The male is readily distinguished by the median carina on the sixth sternite. The female is the only one having a black abdomen which is widely distributed throughout the United States.

Agapostemon coloradinus (Vachal), n. comb.

Agapostemon coloradensis Crawford, Proc. Nebr. Acad. Sci. **7**: 163. 1901.—Cockerell, Ann. Mag. Nat. Hist. (7) **19**: 532. 1907.
Halictus (*Agapostemon*) *coloradinus* Vachal, Misc. Ent. **11**: 90. 1903. (Proposed for *Halictus* (*Agapostemon*) *coloradensis* Crawford, not *Halictus* (*Augochlora*) *coloradensis* Titus.)

Agapostemon tyleri Cockerell, Ann. Mag. Nat. Hist. (8) **20**: 241. 1917 (new synonymy).
Agapostemon martini Cockerell, Pan-Pacific Ent. **3**: 153, female only. 1927 (new synonymy).

Type.—Female (lectotype selected by Crawford), southern Colorado, in the collection of the United States National Museum. The specimen on which Cockerell based the description of the male of *coloradinus* and the type and "cotype" (allotype) of *tyleri* are also in this collection. The type of *martini* is in the collection of the California Academy of Sciences.

Distribution.—Apparently limited to the southern Rocky Mountain region from South Dakota and Colorado to western Texas, southern Arizona and Mexico. Only 38 specimens have been seen from the following states: Texas, Colorado, Nebraska, South Dakota, Utah and New Mexico; also from Mexico.

This species is closely related to *virescens* and apparently replaces it in the southwestern part of the United States. The type of *martini* was not seen, but the description of the female agrees well with the type of *coloradinus*. Both sexes of *tyleri* have been compared with *coloradinus* and found to be identical.

Agapostemon melliventris Cresson

Agapostemon melliventris Cresson, Trans. Amer. Ent. Soc. **5**: 101. 1874.—Rept. Geogr. & Geol. Explor. & Surv. 100th Merid. **5**: 721, pl. 33, fig. 4. 1875.—Trans. Amer. Ent. Soc., suppl. p. 293. 1887.—Dalla Torre, Cat. Hymen. **10**: 97. 1896.—Cockerell, Trans. Amer. Ent. Soc. **24**: 146. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7**: 164. 1901.
Agapostemon digueti Cockerell, Proc. Calif. Acad. Sci. **12**: 539. 1924 (new synonymy).

Type.—Female, lectotype, Nevada, in the collection of the Academy of Natural Sciences, Philadelphia. The types of *digueti* are in the collection of the California Academy of Sciences. The synonymy of *digueti* is based upon a study of paratypes of both sexes in the collection of the United States National Museum.

Distribution.—Apparently limited to the extreme southwestern part of the United States and northern Mexico. In the United States extending from southern Texas to southern California and north to Utah and Oklahoma. The variety *plurifasciatus* replaces the typical form in northeastern Colorado northwestern Kansas and Nebraska. About 400 specimens have been examined from the following states: Texas, Oklahoma, Colorado, Nebraska, Utah, New Mexico, Arizona and California; also from Lower California and Mexico.

Agapostemon melliventris var. **plurifasciatus** (Vachal), n. comb.

Agapostemon fasciatus Crawford, Proc. Nebr. Acad. Sci. **7**: 163. 1901.
Halictus (*Agapostemon*) *plurifasciatus* Vachal, Misc. Ent. **11**: 93, 101. 1903. (Proposed for *Halictus* (*Agapostemon*) *fasciatus* Crawford, not *Halictus fasciatus* Nylander.)

Type.—Female and allotype, male (lectotypes selected by Crawford), from Lincoln, Nebraska, in the collection of the United States National Museum.

Distribution.—I have seen specimens of this variety only from Lincoln, Nebraska; Sterling, Colorado; and Clay County, Kansas.

This differs from *melliventris* only in color as given in the key. Since no morphological differences could be found, *plurifasciatus* is considered to be a color variety of *melliventris.*

Agapostemon splendens (Lepeletier)

Halictus splendens Lepeletier, Hist. Nat. Ins. Hymen. **2:** 283, n. 25. 1841.—Cresson, Trans. Amer. Ent. Soc., suppl., p. 293. 1887.—Dalla Torre, Cat. Hymen. **10:** 85. 1896.

Agapostemon aeruginosus Smith, Cat. Hymen. Ins. Brit. Mus. **1:** 86, n. 3. 1853.—Cresson, Trans. Amer. Ent. Soc., suppl., p. 293. 1887.—Dalla Torre, Cat. Hymen. **10:** 97. 1896.

Agapostemon nigricornis Robertson (not Fabricius), Trans. Amer. Ent. Soc. **20:** 147. 1893.—Dalla Torre, Cat. Hymen. **10:** 97. 1896.

Agapostemon splendens Robertson, Trans. Acad. Sci. St. Louis **7:** 328. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7:** 161. 1901.—Howard, Insect Book, pl. 3, fig. 14. 1905.—Graenicher, Ann. Ent. Soc. Amer. **23:** 158, 168. 1930.

Halictus (*Agapostemon*) *aeruginosus* Vachal, Misc. Ent. **11:** 95. 1903.

Halictus (*Agapostemon*) *splendens* Vachal, Misc. Ent. **11:** 95. 1903.

Halictus (*Agapostmeon*) *nigricornis* Vachal, Misc. Ent. **11:** 100. 1903.

Type.—Female. "Carolina." The present location of the type is unknown to the writer. The type of *aeruginosus* is in the British Museum where it was compared by Cockerell and Waterston with specimens of *splendens* and the synonymy confirmed.

Distribution.—Insofar as is known, distributed throughout the eastern and central United States from southern New Hampshire to southern Florida and west to Texas and eastern Colorado. No specimens have been seen from north of the 45th degree of latitude nor west of the 105th meridian. Over 300 specimens have been examined from the following states: New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Maryland, Virginia, North Carolina, Georgia, Florida, Alabama, Michigan, Indiana, Illinois, Iowa, Minnesota, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Colorado, Kansas, Nebraska, and Arizona.

Agapostemon cockerelli Crawford

Agapostemon cockerelli Crawford, Proc. Nebr. Acad. Sci. **7:** 161. 1901.——Cockerell, Pan-Pacific Ent. **3:** 155, female only. 1927.

Agapostemon femoratus Crawford, Proc. Nebr. Acad. Sci. **7:** 162. 1901.—Cockerell, Pan-Pacific Ent. **3:** 157. 1927 (new synonymy).

Agapostemon radiatus Cockerell (not Say), Ent. News **9:** 27. 1898 (new synonymy).

Agapostemon californicus Crawford, Proc. Nebr. Acad. Sci. **7:** 164, female only. 1901 (new synonymy).

Agapostemon pulcher Robertson (not Smith), Canad. Ent. **34**: 49. 1902 (new synonymy).
? *Nomia cillaba* Cameron, Trans. Amer. Ent. Soc. **28**: 376. 1902 (new synonymy).
Halictus (*Agapostemon*) ? *pulcher* Vachal, Misc. Ent. **11**: 94. 1903.
? *Halictus* (*Agapostemon*) *cockerelli* Vachal, Misc. Ent. **11**: 95. 1903.
Halictus (*Agapostemon*) *femoratus* Vachal, Misc. Ent. **11**: 100. 1903.
? *Agapostemon cillaba* Cockerell, Ann. Mag. Nat. Hist. (8), **4**: 311. 1909.
Agapostemon martini Cockerell, Pan-Pacific Ent. **3**: 153, male only. 1927. (new synonymy).

Type.—Female, holotype, from Mesilla Park, New Mexico, in the collection of the United States National Museum. The type (lectotype, selected by Crawford) of *femoratus* from Moscow, Idaho, and a paratype of *martini* are also in this collection. The type of *cillaba* is in the British Museum. The allotype ("cotype") of *martini* is in the collection of the California Academy of Sciences. Cockerell's designation (1927) of a *type locality* for *femoratus* cannot be considered as a true type fixation, as it was based upon a selection of a locality from literature and not from a study of any of the type series.

Distribution.—Insofar as is known, distributed throughout the western part of North America, west of the 100th meridian, from British Columbia to Mexico. It apparently replaces *radiatus* in the west. Over 300 specimens have been examined from the following states: Texas, Colorado, North Dakota, Montana, Wyoming, Idaho, Utah, New Mexico, Arizona, California, Nevada, and Washington. Material was also seen from Alberta and British Columbia, Canada, and from Mexico.

Agapostemon radiatus (Say)

Halictus radiatus Say, Boston Jour. Nat. Hist. **1**: 394, n. 2. 1837.—Leconte, Writ. Thomas Say **2**: 772, n. 2. 1859.
Halictus tricolor Lepeletier, Hist. Nat. Ins. Hymen. **2**: 289, n. 33. 1841.
Augochlora radiata Smith, Cat. Hymen. Ins. Brit. Mus. **1**: 80, n. 22. 1853.—Dalla Torre, Cat. Hymen. **10**: 96, in part. 1896.
? *Agapostemon tricolor* Smith, Cat. Hymen. Ins. Brit. Mus. **1**: 86, n. 2. 1853.
Agapostemon pulchra Smith, Cat. Hymen. Ins. Brit. Mus. **1**: 87, n. 4. 1853. —Cresson, Trans. Amer. Ent. Soc. suppl., p. 293. 1887.
Agapostemon radiatus Cresson, Trans. Amer. Ent. Soc. suppl., p. 293. 1887. —Robertson, Trans. Amer. Ent. Soc. **20**: 147, in part. 1893.—Dalla Torre, Cat. Hymen. **10**: 97. 1896.—Robertson, Trans. Acad. Sci. St. Louis **7**: 327. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7**: 163, in part. 1901.—Howard, Insect Book, pl. 3, fig. 11. 1905.—Lutz, Fieldbook of Insects, pl. xciv. 1918 (1st ed.), 1921 (2d. ed.).
Agapostemon tricolor Robertson, Trans. Amer. Ent. Soc. **20**: 148. 1893.
Agapostemon pulcher Dalla Torre, Cat. Hymen. **10**: 97. 1896.
Halictus (*Agapostemon*) *radiatus* Vachal, Misc. Ent. **11**: 95, 102, 104. 1903.
?*Halictus* (*Agapostemon*) *cockerelli* Vachal, Misc. Ent. **11**: 94. 1903.
Agapostemon sulcatulus Cockerell, Ann. Mag. Nat. Hist. (8), **4**: 25. 1909 (new synonymy).

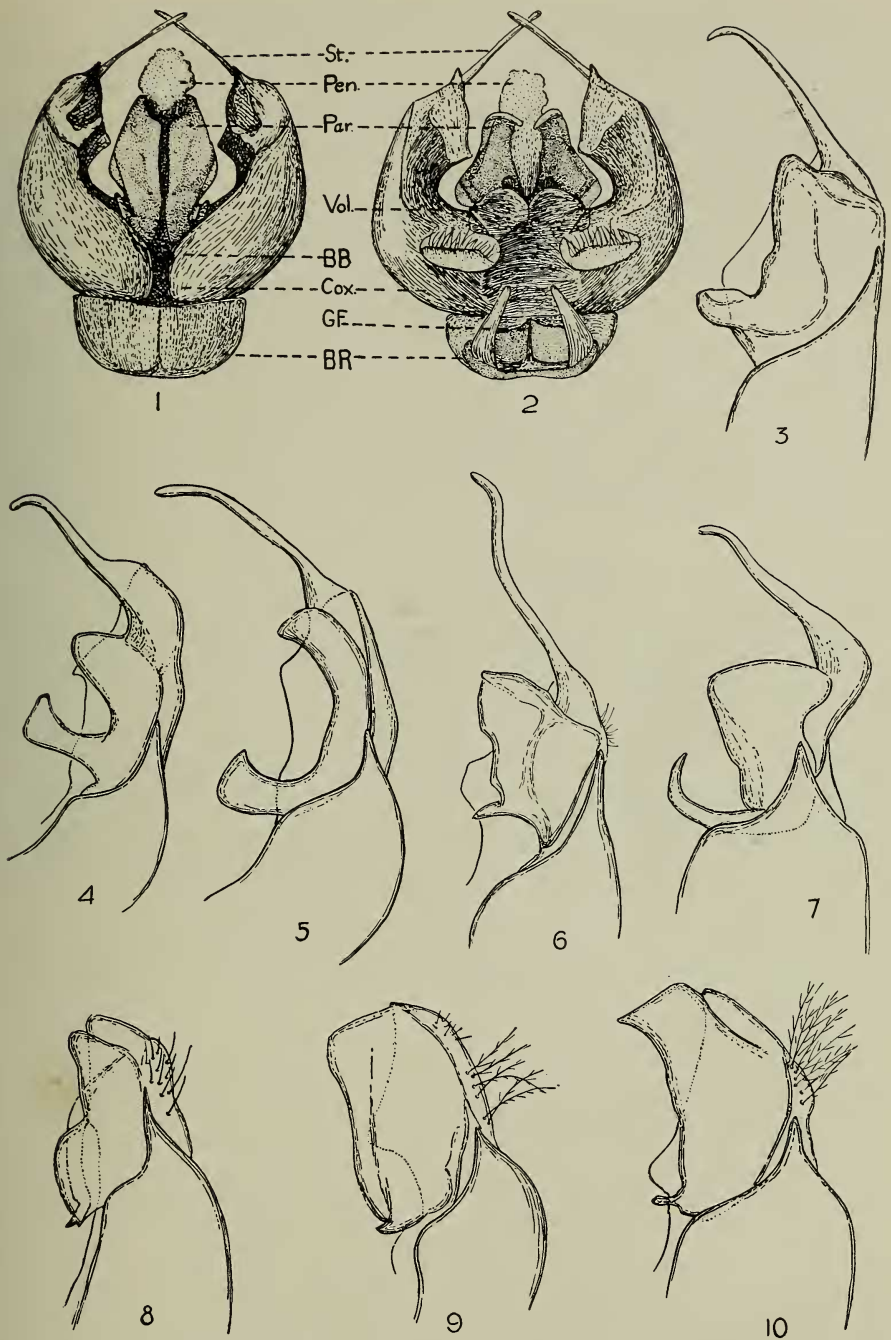

Fig. 1.—*Agapostemon virescens* (Fabricius). Male genitalia, dorsal view. Fig. 2.—*A. virescens*. Male genitalia, ventral view. BR, Basal Ring; BB, Basal Bridge; GF, Genital Foramen; Cox., Coxopodite; St., Stylus; Vol., Volsella; Par., Paramere; Pen., Penis. Fig. 3.—*A. virescens*. Distal portion of coxopodite, dorsal view. Fig. 4.—*A. angelicus* Cockerell. Distal portion of coxopodite, dorsal view. Fig. 5.—*A. splendens* (Lepeletier). Distal portion of coxopodite, dorsal view. Fig. 6.—*A. coloradius* (Vachal). Distal portion of coxopodite, dorsal view. Fig. 7.—*A. texanus* Cresson. Distal portion of coxopodite, dorsal view. Fig. 8.—*A. melliventris* Cresson. Distal portion of coxopodite, dorsal view. Fig. 9.—*A. radiatus* (Say). Distal portion of coxopodite, dorsal view. Fig. 10.—*A. cockerelli* Crawford. Distal portion of coxopodite, dorsal view. The illustrations were made by Mrs. Eleanor A. Carlin of the Bureau of Entomology and Plant Quarantine.

Type.—Female, Indiana, probably destroyed. The location of the type of *tricolor* is unknown to the writer. The type of *pulchra* is in the British Museum, where it was seen by Cockerell and Waterston and its synonymy confirmed. They felt that the locality "California" on the type of *pulchra* must have been erroneous. The type of *sulcatulus* is in the United States National Museum.

Distribution.—Insofar as is known, distributed throughout the eastern part of the United States, east of the 105th meridian, from Maine to Georgia and from North Dakota to northern Texas. It is apparently replaced in the western states by *cockerelli.* About 650 specimens have been examined from the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Alabama, Kentucky, Tennessee, Ohio, Michigan, Indiana, Illinois, Iowa, Minnesota, Wisconsin, Missouri, Louisiana, Texas, Oklahoma, Colorado, Kansas, Nebraska, North Dakota, South Dakota, and New Mexico.

Agapostemon texanus Cresson

Agapostemon texanus Cresson, Trans. Amer. Ent. Soc. **4**: 255, in part. 1872.—Trans. Amer. Eng. Soc. suppl., p. 293. 1887.—Dalla Torre, Cat. Hymen. **10**: 97. 1896.—Robertson, Trans. Acad. Sci. St. Louis **7**: 325. 1897.—Crawford, Proc. Nebr. Acad. Sci. **7**: 160, (? in part). 1901.—Howard, Insect Book, pl. 14, fig. 2. 1905.

Agapostemon texanus subtilior Cockerell, Ent. News **9**: 27. 1898.—Crawford, Proc. Nebr. Acad. Sci. **7**: 160. 1901(new synonymy).

Agapostemon californicus Crawford, Proc. Nebr. Acad. Sci. **7**: 164, male only. 1901 (new synonymy).

Agapostemon borealis Crawford, Proc. Nebr. Acad. Sci. **7**: 160. 1901.—Cockerell, Pan-Pacific Ent. **3**: 156. 1927 (new synonymy).

Halictus (*Agapostemon*) *borealis* Vachal, Misc. Ent. **11**: 94. 1903.

Halictus (*Agapostemon*) *texanus* Vachal, Misc. Ent. **11**: 94. 1903.

Halictus (*Agapostemon*) *subtilior* Vachal, Misc. Ent. **11**: 95, 102, 104. 1903.

Agapostemon texanus iowensis Cockerell, Ann. Mag. Nat. Hist. (8), **5**: 363. 1910 (new synonymy).

Agapostemon texanus vandykei Cockerell, Proc. Calif. Acad. Sci. **14**: 191. 1925 (new synonymy).

Agapostemon cockerelli Cockerell, not Crawford, Pan-Pacific Ent., **3**: 155, male only. 1927 (new synonymy).

Agapostemon vandykei Cockerell, Pan-Pacific Ent. **3**: 155. 1927.

Type.—Female, lectotype, from Texas, in the collection of the Academy of Natural Sciences of Philadelphia. The type of *subtilior* is probably in Cockerell's collection. The type of *borealis* is in the Academy of Natural Sciences of Philadelphia. The type of *iowensis* and the lectotype (selected by Crawford) of *californicus* are in the United States National Museum. The type of *vandykei* is in the collection of the California Academy of Sciences.

Distribution.—Insofar as is known, distributed throughout the United

States from coast to coast north of the 40th degree of latitude, extending southward along the Appalachian Mountains to North Carolina, along the Rocky Mountains to southern Texas and Mexico, and along the Pacific Coast Ranges to southern California. About 1000 specimens have been examined from the following states: New Hampshire, Connecticut, New York, Pennsylvania, North Carolina, Michigan, Indiana, Illinois, Iowa, Minnesota, Wisconsin, Louisiana, Texas, Oklahoma, Colorado, Kansas, Nebraska, North Dakota, South Dakota, Montana, Wyoming, Idaho, Utah, New Mexico, Arizona, California, Oregon, Nevada, and Washington.

Agapostemon angelicus Cockerell

Agapostemon angelicus Cockerell, Proc. Calif. Acad. Sci. **12**: 537. 1924.—Pan-Pacific Ent. **3**: 156. 1927.
Agapostemon texanus Cresson, Trans. Amer. Ent. Soc. **4**: 255, in part. 1872.—? Authors, in part (new synonymy).
Halictus (*Agapostemon*) *texanus* Vachal, Misc. Ent. **11**: 94, ? in part. 1903.

Type.—Female, Pond Island, Bay, Angel de la Guarda Island, in the collection of the California Academy of Sciences.

Distribution.—Apparently limited to the southern Rocky Mountain region from southern Texas to North Dakota and Idaho and along the Pacific Coast from southern California to the 40th degree of latitude. Over 400 specimens have been examined from the following states: Texas, Colorado, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Idaho, Utah, New Mexico, Arizona, and California.

This species is very similar to *texanus* and has undoubtedly been confused with it in most collections. The females may be distinguished by the sculpturing of the dorsal surface of the propodeum; the males, by the markings on the hind legs.